

# Genetic population structure and connectivity of the big blue octopus, *Octopus cyanea* (Gray, 1849), in the Western Indian Ocean

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## INTRODUCTION



Figure 1: Artisanal octopus fishing in Madagascar  
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- Traditional octopus fishing is economically very important for communities in the Western Indian Ocean (WIO) (Fig.1) [1]
- Increasing market demand for cephalopods worldwide [2]
- Growth of artisanal African octopus fisheries and drastically increasing exploitation rates of *Octopus cyanea* populations (Fig. 2) [3]
- Concern over sustainability [3]
- Networks of Marine Protected Areas (MPAs) are necessary
- Connectivity among populations through larval dispersal should be taken into account when designing MPAs [4]
- **This study:**
  - determining connectivity in WIO by using cytochrome C oxidase subunit 1 (COI) gene as marker



Figure 2: *Octopus cyanea* (big blue octopus)  
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## Research questions

1. Is a genetic break present between the populations of Madagascar and the African mainland?
2. Is there gene flow among populations along the coast of Madagascar?
3. Are the results comparable when using microsatellite markers?

## MATERIALS AND METHODS

### SAMPLING

- Arm tips of 275 individuals
- 15 sample sites in the WIO (Fig. 3)
- samples were preserved in 95% ethanol

### LAB PROCESSING

- DNA extraction
- Primer testing + establishing PCR protocol
- PCR using COI marker
- DNA sequencing

### ANALYSIS OF DATA

- Sequence editing (CHROMASPRO)
- DNA barcoding
  - BLAST (Genbank)
  - Neighbor Joining Tree (MEGA 7)
- Sequence alignment (Clustal W, MEGA 7)
- Quality control (MEGA 7)
- DNA collapsing (FABOX)
- Further DNA analysis (Arlequin)

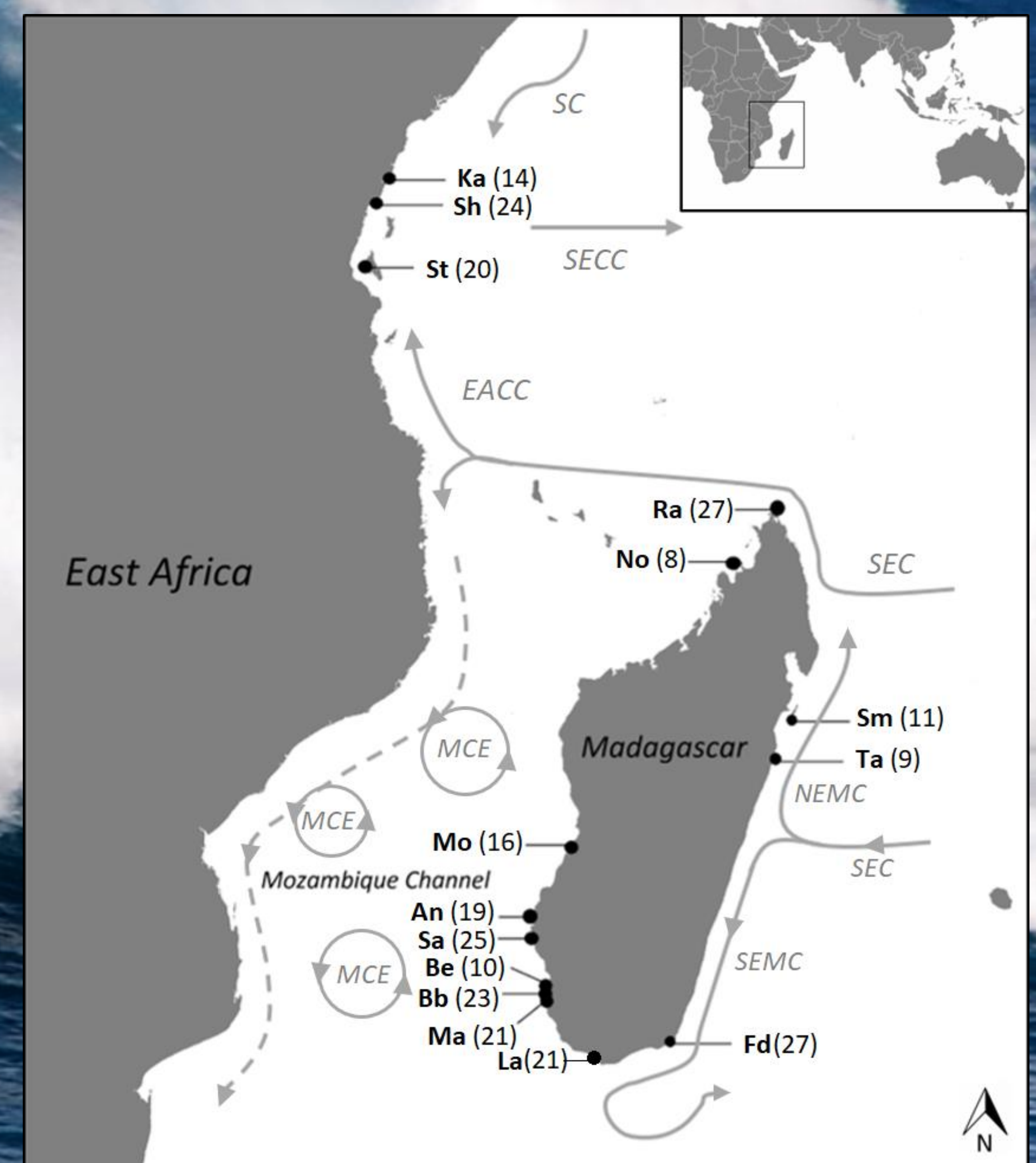


Figure 3: Map of the East African coast and Western Indian Ocean (WIO) showing sample sites (•). Twelve sites are located in Madagascar (Ramenà (Ra), Nosy be (No), Morondava (Mo), Andavadoaka (An), Salary (Sa), Beheloke (Be), Besambay (Bb), Maromena (Ma), Lavanono (La), Fort Dauphin (Fd), Tamatave (Ta) and Sainte-Marie (Sm)), one in Tanzania (Stone Town (St)) and two in Kenya (Shimoni (Sh) and Kanamāi (Ka)). Number of samples between brackets. Major ocean currents are indicated schematically. SC: Somali Current; SECC: South Equatorial Counter Current; EACC: East African Coast Current; NEMC: Northeast Madagascar Current; SEC: South Equatorial Current; SEMC: Southeast Madagascar Current; MCE: Mozambique Channel Eddies.

## PRELIMINARY RESULTS

- ✓ Universal primers were selected and used for PCR [5]
  - Forward primer HCO2198 (5'-TAA ACT TCA GGG TGA CCA AAA AAT CA-3')
  - Reverse primer LCO1490 (5'-GGT CAA CAA ATC ATA AAG ATA TTG G-3')
- ✓ Successfully established PCR protocol (Fig. 4)

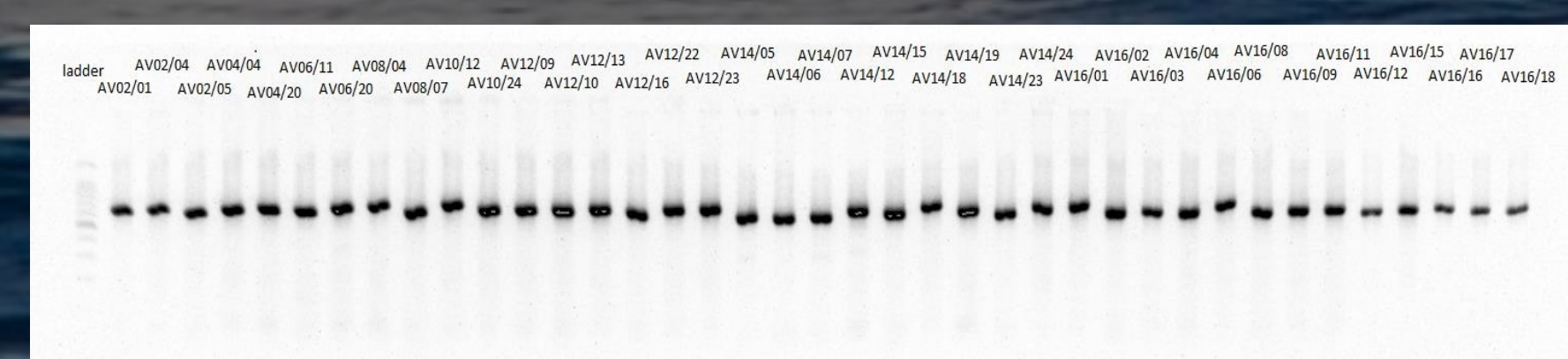


Figure 4: gel electrophoresis results showing length of successfully amplified DNA fragments.

- ✓ DNA barcoding (BLAST):
  - Only Lavanono (La) and Fort Dauphin (Fd) contained multiple species:
    - La (n = 21): 20 *O. vulgaris*, 1 *O. oliveri*
    - Fd (n = 27): 2 *O. cyanea*, 10 *O. vulgaris*, 9 *C. luteus* and 6 *C. orantus*
  - All other sites: 100 % *O. cyanea*



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